

Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R7NHMC

Eastern White Pine Northern Hardwood

General Information

Contributors (additional contributors may be listed under "Model Evolution and Comments")

Modelers

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Vegetation Type

Forested

Dominant Species*

PIST QURU
ACSA3
BEAL2
FAGR

General Model Sources

- Literature
- Local Data
- Expert Estimate

LANDFIRE Mapping Zones

63 66
64
65

Rapid Assessment Model Zones

- | | |
|---|--|
| <input type="checkbox"/> California | <input type="checkbox"/> Pacific Northwest |
| <input type="checkbox"/> Great Basin | <input type="checkbox"/> South Central |
| <input type="checkbox"/> Great Lakes | <input type="checkbox"/> Southeast |
| <input checked="" type="checkbox"/> Northeast | <input type="checkbox"/> S. Appalachians |
| <input type="checkbox"/> Northern Plains | <input type="checkbox"/> Southwest |
| <input type="checkbox"/> N-Cent.Rockies | |

Geographic Range

New England, NY, and the northern parts of PA, Appalachian Mountains south to northern GA. Northern red oak dynamics perhaps NOT applicable in northern Maine and n. Vermont.

Biophysical Site Description

Mesic to somewhat xeric sites over a broad range of topographic conditions including ravines, valley flats, sheltered low ridges, lower to mid-slopes, and steep, exposed slopes. Soils are usually acidic, tending toward sandy and gravelly soils. Species diversity tends to be low.

Vegetation Description

The characteristic species are eastern white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), paper, gray, black, sweet, and yellow birch (*Betula papyrifera*, *B. cordifolia*, *B. nigra*, *B. lenta*, *B. alleghaniensis*), beech (*Fagus grandifolia*), northern red oak (*Quercus rubra*), white oak (*Q. alba*). American chestnut (*Castanea*) would have been a co-dominant before its near-extirpation.

Other common associates include eastern hemlock (*Tsuga canadensis*), striped maple (*A. pensylvanicum*), red maple (*A. rubrum*), mountain maple (*A. spicatum*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), basswood (*Tilia americana*), and American elm (*Ulmus americana*). Occasional associates might include blackgum (*Nyssa sylvatica*), yellow poplar (*Liriodendron tulipifera*), and hickory (*Carya* spp.). Shrub layer might include Canada yew (*Taxus canadensis*), shadbush (*Amelanchier* spp.), raspberry (*Rubus idaeus* and *R. alleghaniensis*), and spirea (*Spiraea alba*), low sweet blueberry (*Vaccinium angustifolium*), black huckleberry (*Gaylussacia baccata*) and viburnum (*Viburnum* spp.). American chestnut (*Castanea dentata*) was not included because it is not considered recoverable.

Disturbance Description

Fire disturbances are severe and affect large patch sizes. Surface fire is extremely rare, at 1,000 year intervals, while replacement fire is more frequent at 300 to 1,000-year intervals. Other disturbances,

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

including windthrow, insect attack, and ice storms, are more important than fire although they may pre-dispose the forest to fire during drought conditions. They are more frequent than fire but affect a smaller percentage of the community type.

Adjacency or Identification Concerns

To classify this model as a northern hardwoods model puts less emphasis on eastern white pine than the authors intend. See model NHDW2, upon which this model was based.

Scale Description

Sources of Scale Data Literature Local Data Expert Estimate

(Hi Kelly and Ayn -- not sure how best to do this part)

Issues/Problems

Native American use of fire might be under-represented in the literature and in current interpretation of reference conditions. Along alluvial plains, on lower to mid slopes, and especially along the coast, anthropogenic fires might have been a disturbance factor for at least 6,000 years.

Model Evolution and Comments

This model is based on the FRCC model NHDW2.

Suggested reviewers: Bill Patterson III, Alan S. White (University of Maine, Orono), Erin Small, Sue Gawler

Use of fire by Native Americans most likely played a prominent role in maintaining savannah like areas (Erin Small). Wind events may have had a greater influence in the Class B stands, which would send more stands to Class C (Erin Small).

Logging records may help to determine how common white pine were prior to European settlement. Also the Silvics Manual (Burns and Honkala) explains the need for light in regenerating pine (Erin Small).

Peer reviewed by Erin Small, Fire Planner USDS Forest Service White Mountain/Green Mountain/Finger Lakes National Forests, 04/22/05.

Succession Classes
Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 15%

Early1 All Structures

Description

Young stand, less than 50 yrs old, might be initially colonized by red raspberry (*Rubus idaeus*), blackberry (*R. alleghaniensis*), gray dogwood (*Cornus racemosa*), or other shrubs, and possibly striped maple (*Acer pennsylvanicum*). Overstory spp. Include paper, gray, black, and/or yellow birch, white pine, pin cherry, shadbush, and red maple, with white ash. Northern red oak is possible on well-drained sites. See also Class E for a

Indicator Species* and Canopy Position

BEPA Upper
BEAL2 Upper
PRSE2 Low-Mid
ACRU Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 11

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Shrub Medium 1.0-2.9m	Tree Medium 10-24m
Tree Size Class	Medium 9-21"DBH	

- Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

scenario in which a stand replacing fire or wind storm results in an opening that eastern white pine fills and grows into a monotypic stand.

Although not dominant red spruce, eastern white pine and balsam fir are present in this early successional class.

FM 11 is a worst-case scenario
Another FM that might apply is 8.

Class B 20%

Mid1 Closed

Description

Intermediate stand dominated by eastern white pine, yellow birch, and sugar maple, with northern red oak; ca. 50 - 140 yrs old. Beech is possible on ridges and slopes. Balsam fir may be abundant on mid- to upper slopes or moist soils. Minor components might include red spruce (*Picea rubens*), paper birch, gray birch, eastern hemlock, and others.

Eastern white pine may exceed 21" DBH before 140 years, and the pines may be emergent by this age.

Indicator Species* and Canopy Position

PIST Upper
BEAL2 Upper
ACSA3 Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	90 %	100 %
<i>Height</i>	Tree Medium 10-24m	Tree Tall 25-49m
<i>Tree Size Class</i>	Medium 9-21"DBH	

- Upper layer lifeform differs from dominant lifeform.
Height and cover of dominant lifeform are:

Class C 5%

Late1 Open

Description

Ice storm events could generate openings. Surface fire, insect attack, or other patch disturbance might contribute to opening the stand. Disturbances other than surface fire are more likely to contribute to generation of gaps. Soils are likely to be extremely well-drained, or with ledge. See NatureServe 2004 for more details about dynamics with northern red

Indicator Species* and Canopy Position

PIST Upper
ACSA3 Upper
BEAL2 Upper
QURU Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
<i>Cover</i>	60 %	90 %
<i>Height</i>	Tree Medium 10-24m	Tree Giant >50m
<i>Tree Size Class</i>	Very Large >33"DBH	

- Upper layer lifeform differs from dominant lifeform.
Height and cover of dominant lifeform are:

*Dominant and Indicator Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

oak. Understory might have blueberry, huckleberry, or a grass layer, with sparse pines among the hardwoods.

Class D 55%

Late1 Closed

Description

Mature stand characterized by white pine, with beech, sugar maple, yellow birch, and hemlock, white ash, black cherry. Stand age could be as young as 140 years. White pine could be emergent, even ca. 50 feet above the other species.

Indicator Species* and Canopy Position

PIST Upper
ACSA3 Upper
BEAL2 Upper
FAGR Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	100 %
Height	Tree Tall 25-49m	Tree Giant >50m
Tree Size Class	Very Large >33"DBH	

- Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class E 5%

Early2 Closed

Description

Early succession dominated by eastern white pine following a stand-replacing fire or catastrophic wind-throw event. Pine excludes other tree species for possibly hundreds of years. These pure pine patches are in a matrix of conifer-northern hardwoods, may be fairly small.

Indicator Species* and Canopy Position

PIST Upper

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model 5

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	100 %
Height	Tree Tall 25-49m	Tree Giant >50m
Tree Size Class	Very Large >33"DBH	

- Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Disturbances

Non-Fire Disturbances Modeled

- Insects/Disease
- Wind/Weather/Stress
- Native Grazing
- Competition
- Other:
- Other:

Fire Regime Group: 5

- I: 0-35 year frequency, low and mixed severity
- II: 0-35 year frequency, replacement severity
- III: 35-200 year frequency, low and mixed severity
- IV: 35-200 year frequency, replacement severity
- V: 200+ year frequency, replacement severity

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

Historical Fire Size (acres)

Avg:
Min:
Max:

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Sources of Fire Regime Data	<i>Avg FI</i>	<i>Min FI</i>	<i>Max FI</i>	<i>Probability</i>	<i>Percent of All Fires</i>
<input checked="" type="checkbox"/> Literature	<i>Replacement</i>	475		0.00211	72
<input type="checkbox"/> Local Data	<i>Mixed</i>				
<input checked="" type="checkbox"/> Expert Estimate	<i>Surface</i>	1250		0.0008	27
	<i>All Fires</i>	344		0.00292	

References

Kuchler, A.W. 1964. Northern hardwoods (Acer-Betula-Fagus-Tsuga). #106 In: Manual to accompany the map Potential Natural Vegetation of the United States. New York, NY: The American Geographical Society. 156 p.

Lorimer, C. G. and A. S. White. 2003. Scale and frequency of natural disturbances in the northeastern US: implications for early successional forest habitats and regional age distributions. *Forest Ecology and Management* 185: 41-64.

NatureServe. 2004. International Ecological Classification Standard: Terrestrial Ecological Systems of the United States. Natural Heritage Central Databases. NatureServe, Arlington, VA.

Patterson, W. A. III, and K. E. Sassmann. 1988. Indian fires in the prehistory of New England. *Holocene Human Ecology in Northeastern North America* (ed. G. P. Nicholas), pp. 107-135. Plenum Press, NY.

Russell, E. W. B. 1983. Indian-set fires in the forests of the northeastern United States. *Ecology* 64: 78-88.